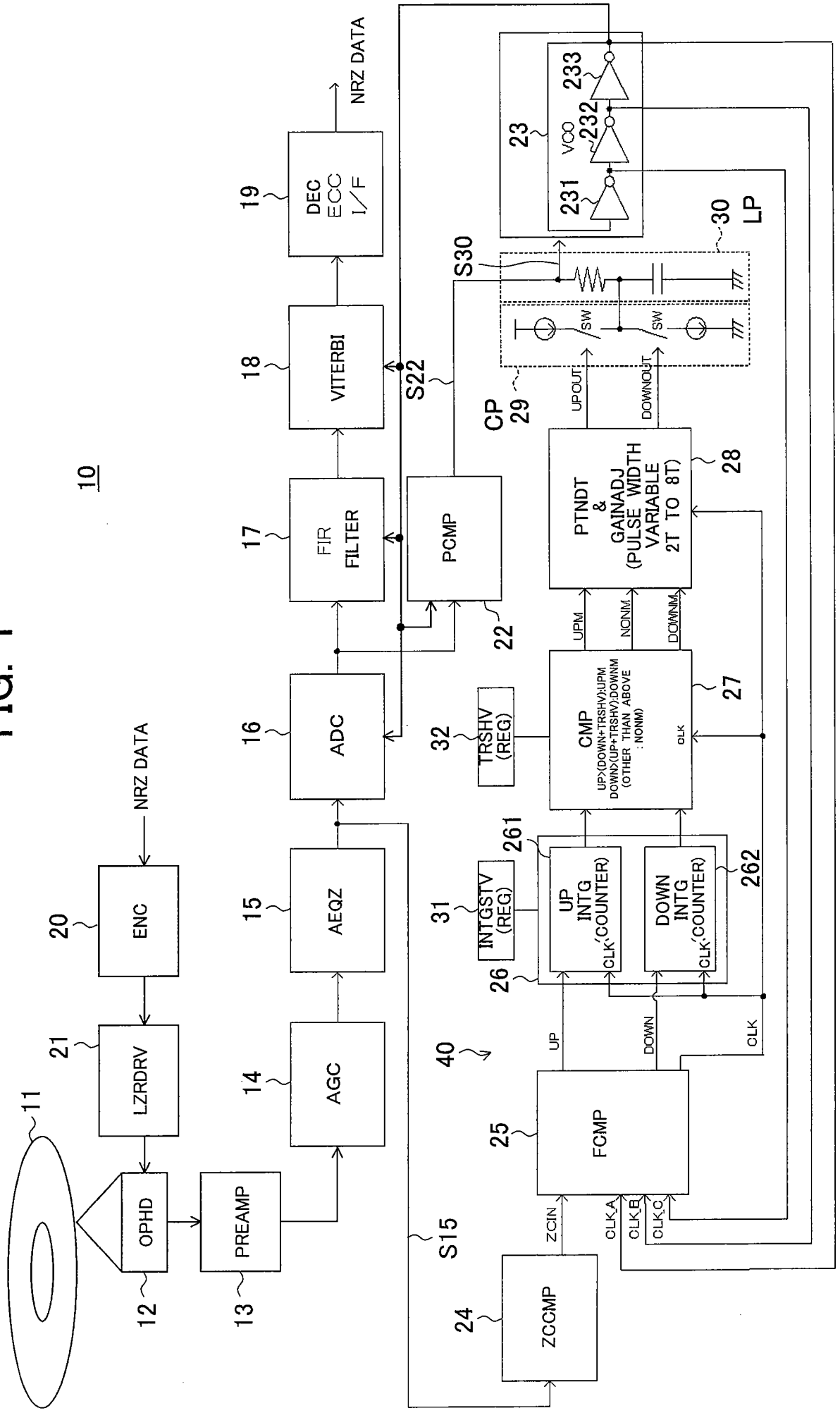
FIG. 1


10
11
12 OPHD
13 PREAMP
14 AGC
15 AEQZ
16 ADC
17 FIR FILTER
18 VITERBI
19 DEC ECC I/F
NRZ DATA
20 ENC
NRZ DATA
21 LZRDRV
22 PCMP
S22
S15
23 VCO 231 232 233
CP 29
S30
30 LP
SW
UPOUT
DOWNOUT
PTNDT & GAINADJ (PULSE WIDTH VARIABLE 2T TO 8T)
28
UPM
NONM
DOWNM
CMP
UP>(DOWN+TRSHV):UPM
DOWN>(UP+TRSHV):DOWNM
(OTHER THAN ABOVE : NONM)
27
CLK
32 TRSHV (REG)
31 INTGSTV (REG)
261
UP INTG (COUNTER)
CLK
262
DOWN INTG (COUNTER)
CLK
26
40
UP
DOWN
CLK
25 FCMP
ZCIN
CLK_A
CLK_B
CLK_C
24 ZCCMP

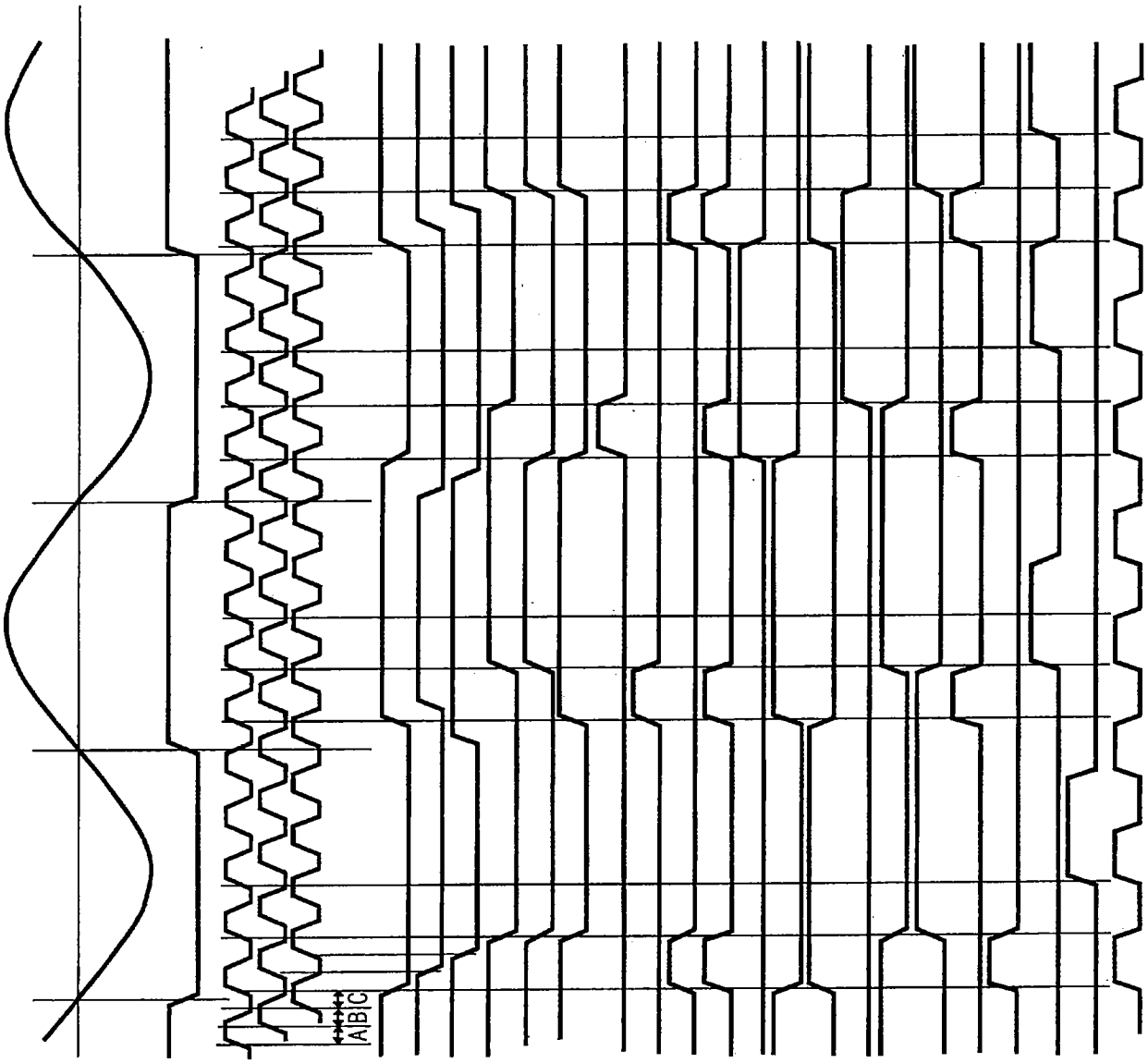


FIG. 2A S15 RADCIN
FIG. 2B ZC
FIG. 2C RCLK A
FIG. 2D RCLK B
FIG. 2E RCLK C
FIG. 2F A0
FIG. 2G B0
FIG. 2H C0
FIG. 2I A1
FIG. 2J B1
FIG. 2K C1
FIG. 2L A2
FIG. 2M B2
FIG. 2N C2
FIG. 2O SW
FIG. 2P A3
FIG. 2Q B3
FIG. 2R C3
FIG. 2S A4
FIG. 2T B4
FIG. 2U C4
FIG. 2V U0
FIG. 2W D0
FIG. 2X UP
FIG. 2Y DOWN
FIG. 2Z CLK2
A|B|C

FIG. 3

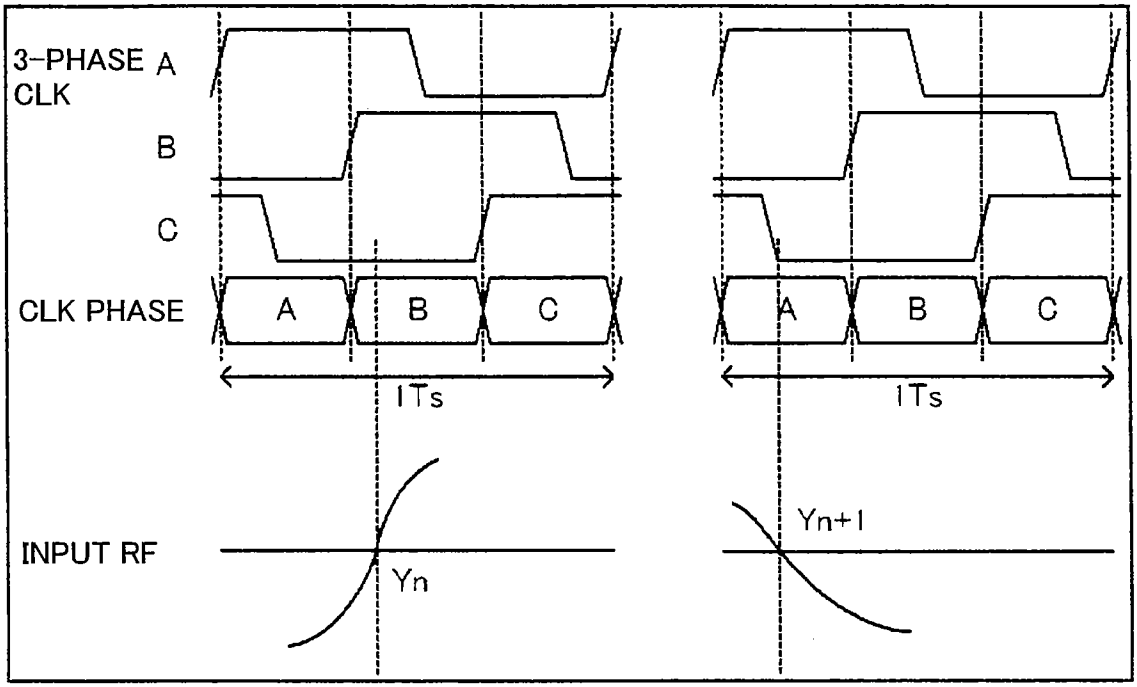


FIG. 4

FREQUENCY COMPARATOR LOGIC

Yn	Yn+1	UP	DOWN
A	A	0	0
A	B	0	1
A	C	1	0
B	A	1	0
B	B	0	0
B	C	0	1
C	A	0	1
C	B	1	0
C	C	0	0

FIG. 5

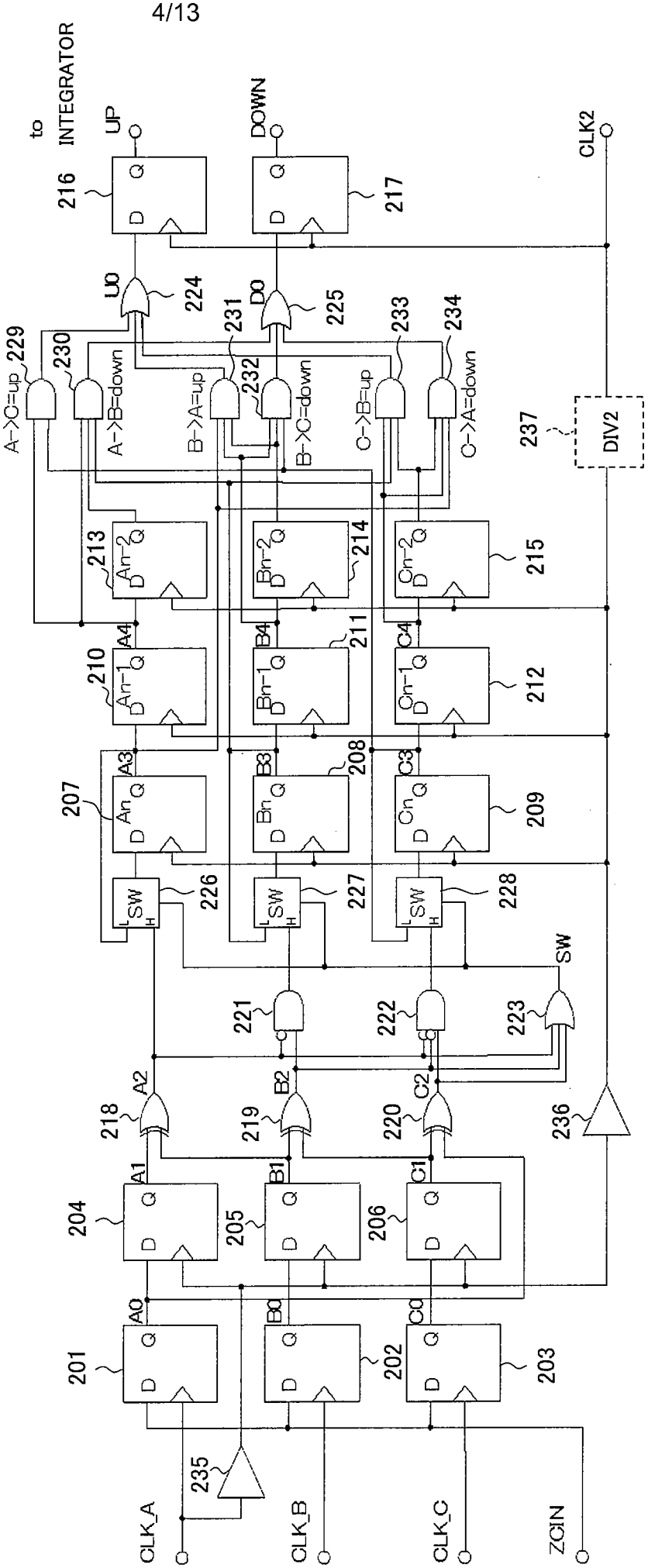

25
to INTEGRATOR
UP
DOWN
CLK2
CLK_A
CLK_B
CLK_C
ZCIN
DIV2
A->C=up
A->B=down
B->A=up
B->C=down
C->B=up
C->A=down
SW

FIG. 6

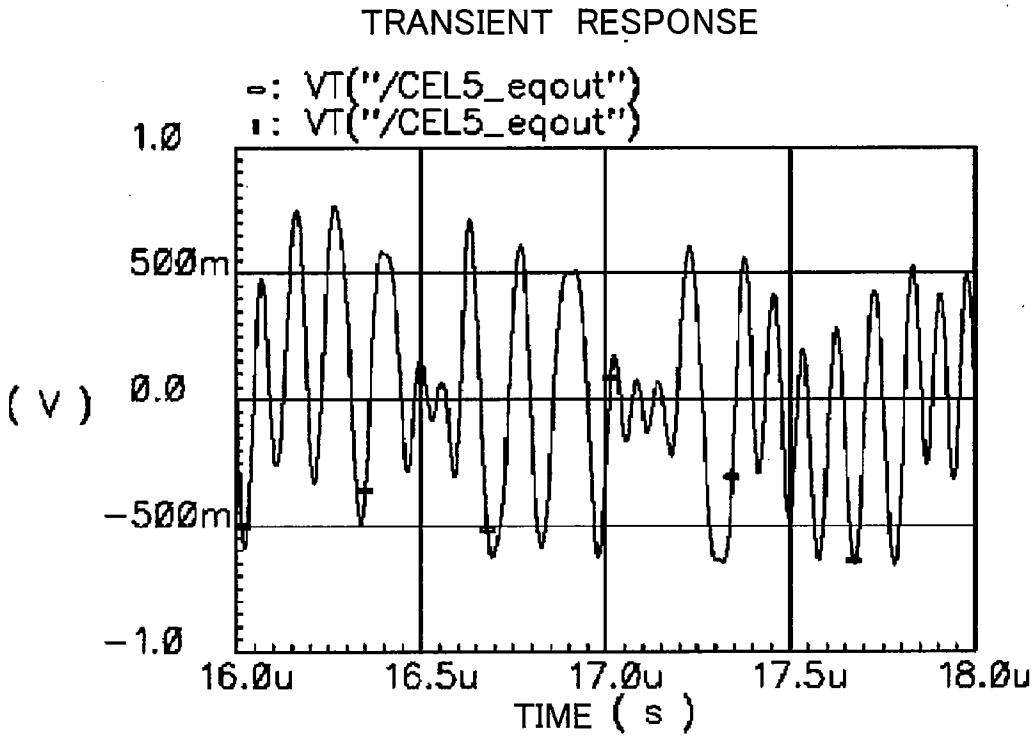

TRANSIENT RESPONSE
o: VT("/CEL5_eqout")
i: VT("/CEL5_eqout")
1.0
500m
0.0
-500m
-1.0
(V)
16.0u
16.5u
17.0u
17.5u
18.0u
TIME (s)

FIG. 7

EXAMPLE OF ZERO CROSS DISTRIBUTION

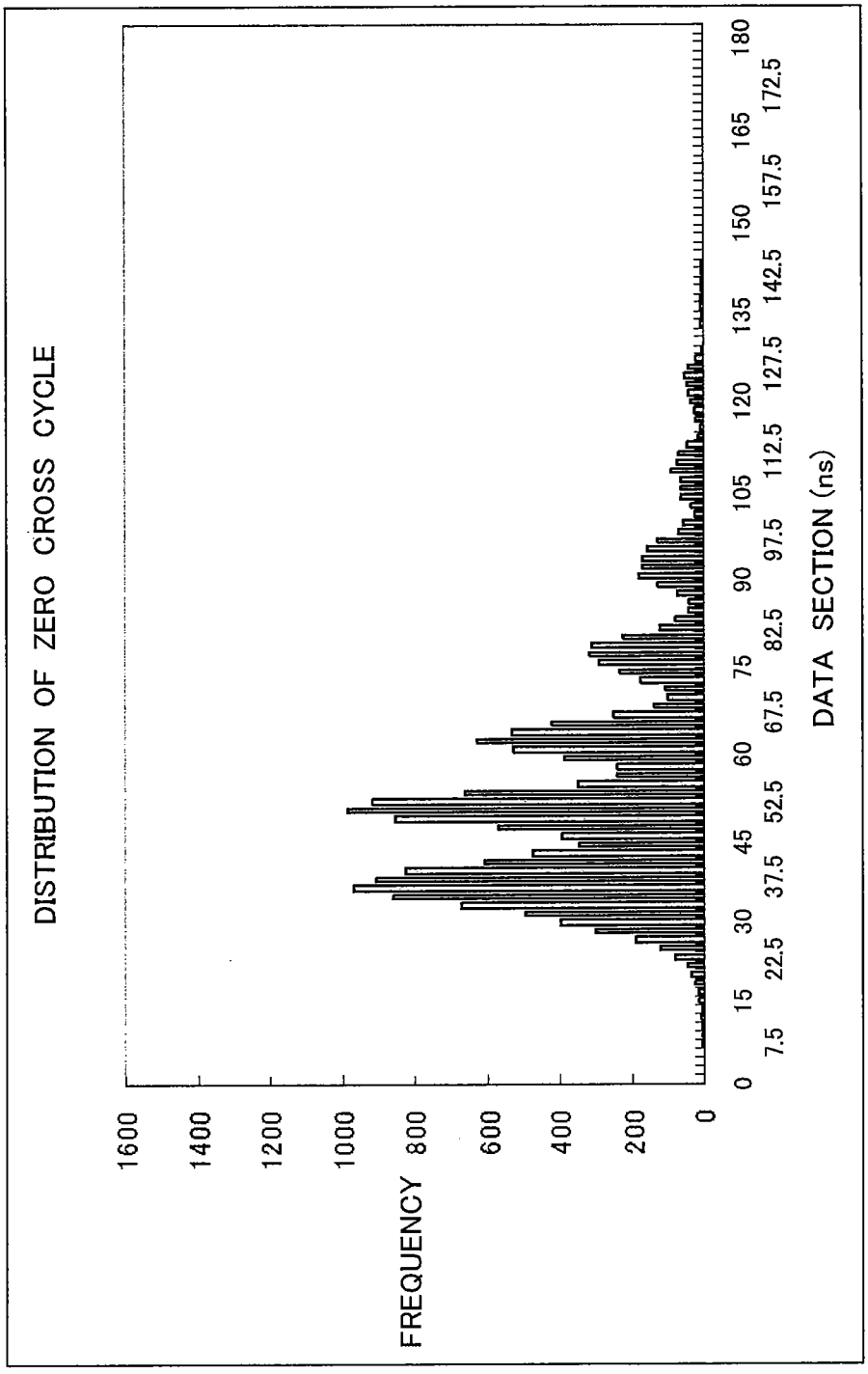
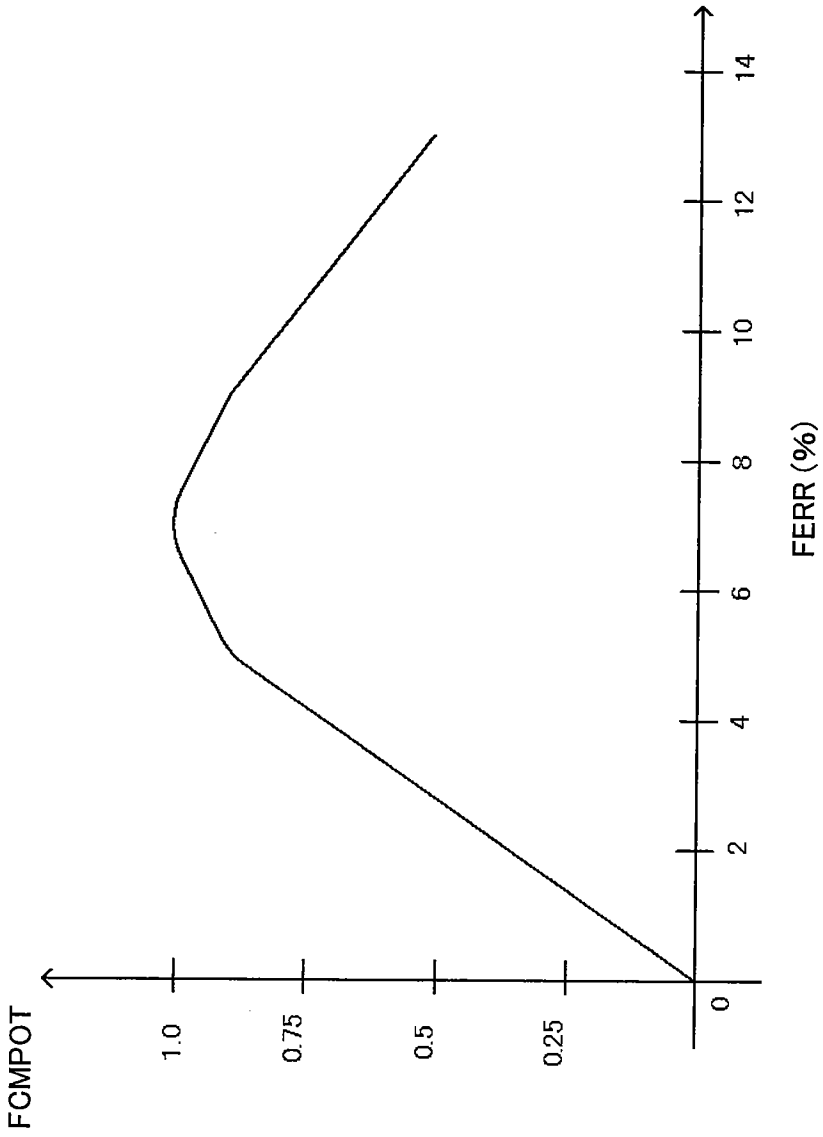


FIG. 8

CASE OF BD ROM (THEORETICAL VALUE)



(CASE WHERE INTEGRATION SETTING VALUE = 8, JUDGEMENT THRESHOLD VALUE = 4, UPM IS OUTPUT)

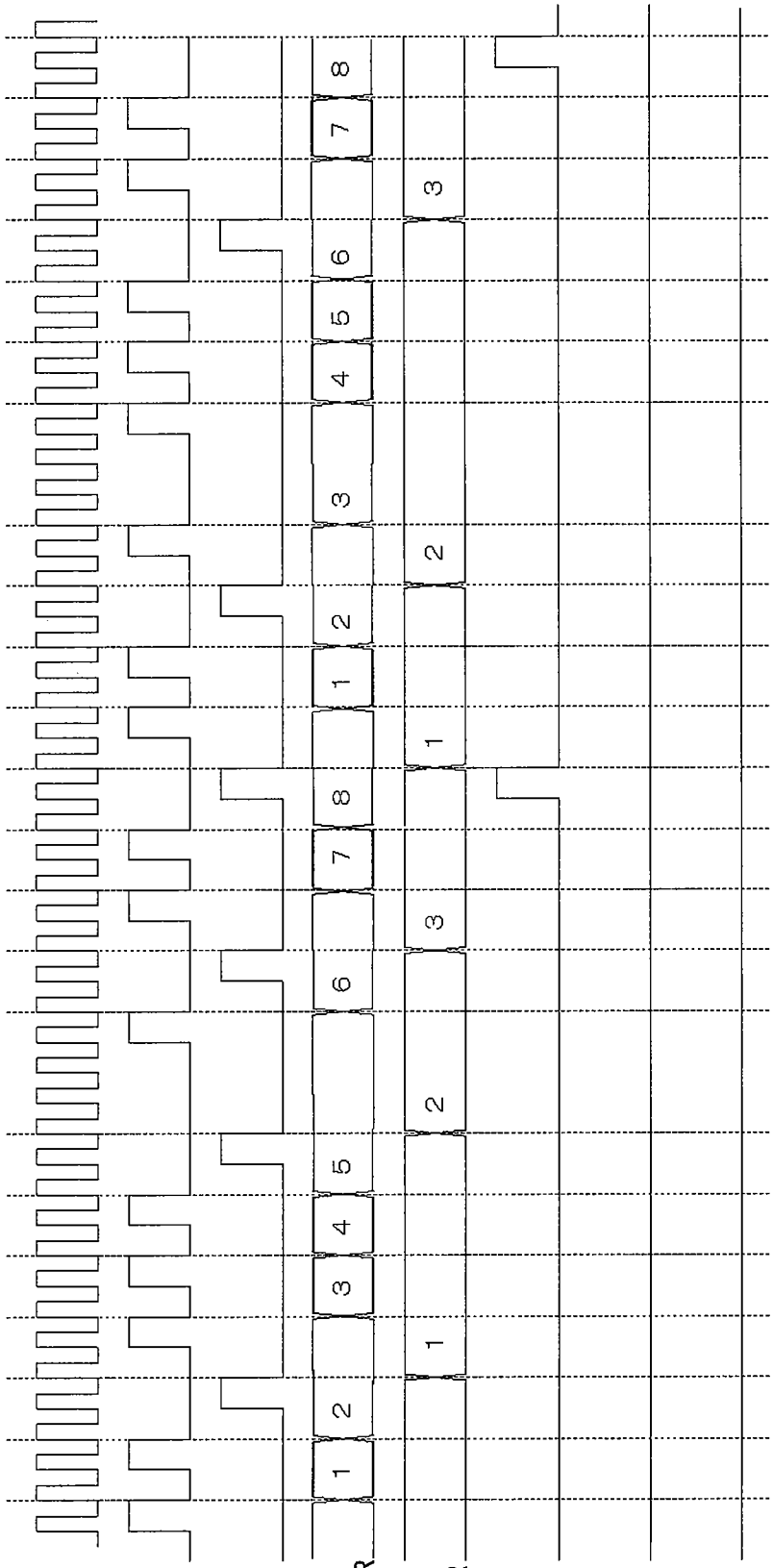


FIG. 9A

FIG. 9B

FIG. 9C

FIG. 9D

FIG. 9E

FIG. 9F

FIG. 9G

FIG. 9H

(CASE WHERE INTEGRATION SETTING VALUE = 8, JUDGEMENT THRESHOLD VALUE = 4, NONM IS OUTPUT)

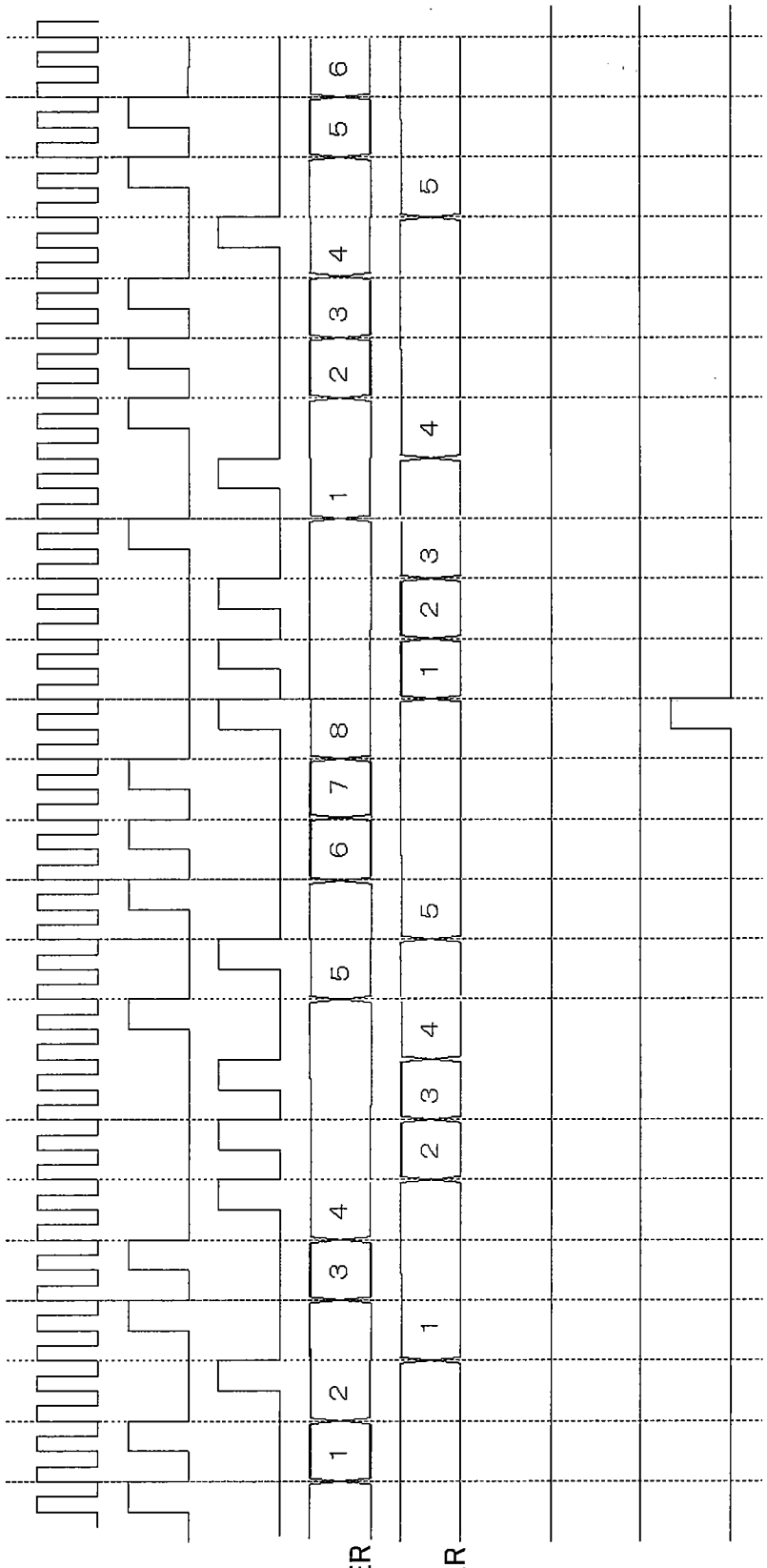


FIG. 10A

FIG. 10B

FIG. 10C

FIG. 10D

FIG. 10E

FIG. 10F

FIG. 10G

FIG. 10H

FIG. 11

THREE TIME PREVIOUS COMPARATOR OUTPUT	TWO TIME PREVIOUS COMPARATOR OUTPUT	ONE TIME PREVIOUS COMPARATOR OUTPUT	PRESENT COMPARATOR OUTPUT	OUTPUT	
				OUTPUT	GAIN (PULSE WIDTH)
OTHER THAN UPM		OTHER THAN UPM	UPM	NONE	0
EITHER IS UPM				UPOUT	0.25(1T)
OTHER THAN UPM		UPM		UPOUT	0.25(1T)
OTHER THAN UPM	UPM			UPOUT	0.5(2T)
UPM	UPM			UPOUT	1(4T)
OTHER THAN DOWNM		OTHER THAN DOWNM	DOWNM	NONE	0
EITHER IS DOWNM				DOWNOUT	0.25(1T)
OTHER THAN DOWNM		DOWNM		DOWNOUT	0.25(1T)
OTHER THAN DOWNM	DOWNM			DOWNOUT	0.5(2T)
DOWNM	DOWNM			DOWNOUT	1(4T)
ALL	ALL	ALL	NONM	NONE	0

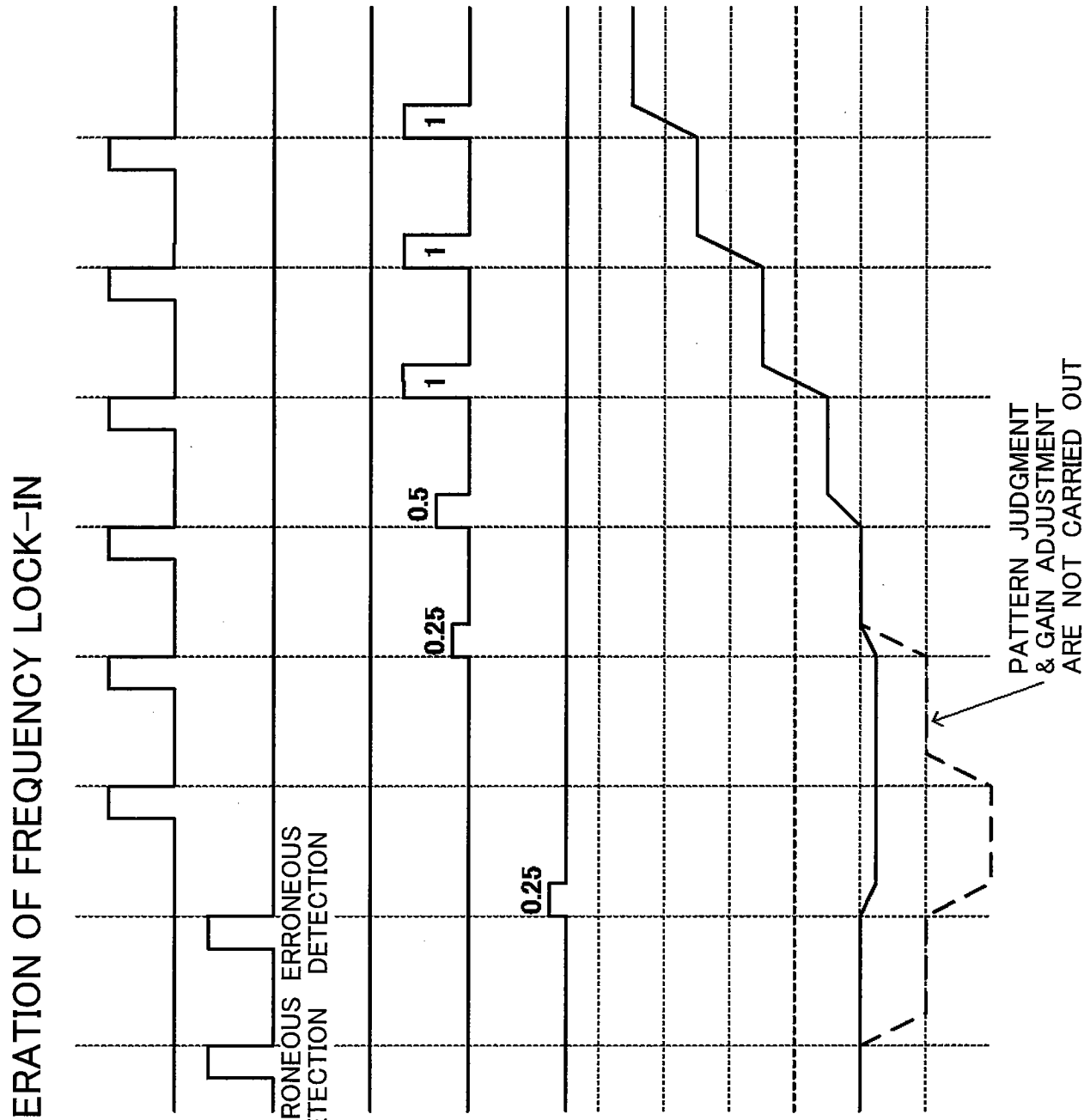


FIG. 12A

FIG. 12B

FIG. 12C

FIG. 12D

FIG. 12E

FIG. 12F

OPERATION DURING FREQUENCY LOCK-IN

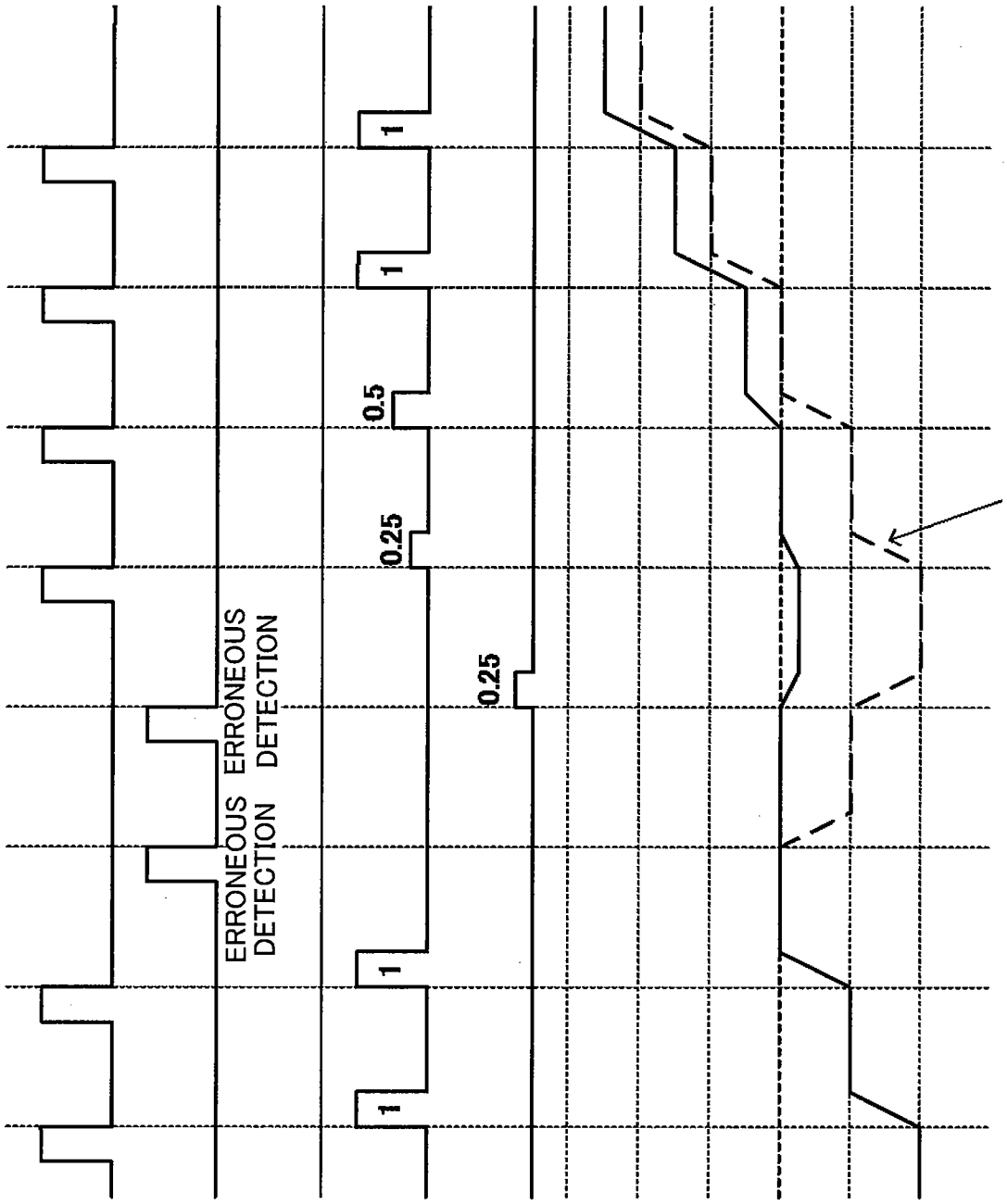


FIG. 13A

FIG. 13B

FIG. 13C

FIG. 13D

FIG. 13E

FIG. 13F

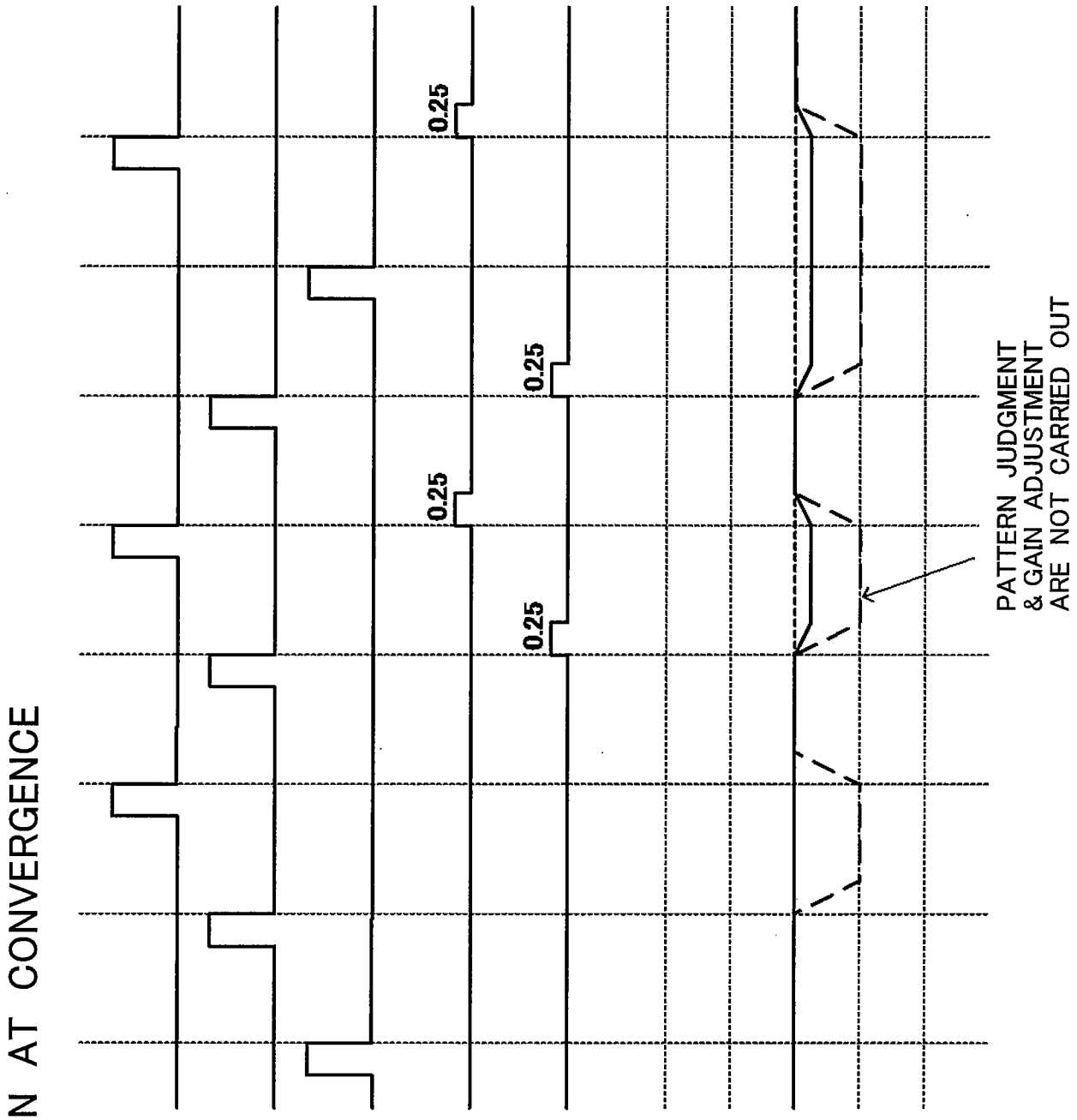


FIG. 14A

FIG. 14B

FIG. 14C

FIG. 14D

FIG. 14E

FIG. 14F